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September 17, 1960
VOL. 78, NO. 12 PAGES 177-192

SCIENCE NEWS LETTER

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THE WEEKLY SUMMARY OF CURRENT SCIENCE

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PSYCHOLOGY

Addict Helps Build Habit

Drug addicts have a relapse to the drug because they have taken active part in its use, Marjorie Van de Water reports from the American Psychological Association meeting.

➤ A NEW psychological explanation for drug addiction shows why patients given opiates for pain do not often become addicts.

When these patients get well and are released from the hospital, they do not show any alteration in their behavior, Dr. John R. Nichols, psychologist of Southeastern Louisiana College, reported to the American Psychological Association in Chicago. They do not rob drugstores, forge prescriptions or show any sign of uncontrollable "craving" for opiates. The overwhelming majority of patients never become addicts, he said.

With illegal drug addicts, the big medical problem is not getting them "off the drug," Dr. Nichols said. It is the problem of relapse after cure.

In experiments on rats, Dr. Nichols used a kind of conditioning called "operant conditioning" to make the animals drug addicts. Some of the rat addicts went back to the drug after being "cured" for weeks. This is probably the first demonstration of relapse by animals, Dr. Nichols indicated.

The reason why Dr. Nichols' rats became addicts and why they later relapsed after "cure" was credited by him to the operant conditioning. In operant conditioning, the subject must do something; he must take an active part in the process.

In these experiments, after the rats had become dependent upon opiates and then had been without the drugs for 48 hours, they were trained to turn their heads in a certain way that started an infusion pump that gave them a shot of the drug.

Thus they learned by their own action to end the distressing withdrawal symptoms.

In man, too, the development of addiction appears to be related to whether he takes an active role in using the drug. Illegal users of opiates are active, Dr. Nichols said. They initiate the drug-taking action and that behavior rapidly becomes a chronic obsessive-compulsion for them.

Passive recipients of opiates, such as hospital patients, however, may become physiologically dependent on the drugs and show withdrawal symptoms but when they are taken away from them, they do not rush out to hunt up a "pusher."

• Science News Letter, 78:179 September 17, 1960

Machine Teaches Russian

➤ USING a do-it-yourself machine, a soldier can learn enough of even the difficult Russian language to be able to take a Russian prisoner.

The machine is a tape recorder with a specially programmed tape. The tape contains Russian phrases that cannot be erased. It also has sections where the soldier-student can record his own pronunciation and play them back, with the original pronunciations, for comparison.

Scientists from George Washington University's Human Resources Research Office (HUMRRO), Washington, D. C., described an experiment to the American Psychological Association in Chicago that indicated the language machine is successful.

In experiments, soldiers learned a 450-word miniature of the Russian language entirely by machine. At the end of the course, which required 20 days, the soldiers were able to take "prisoners." (Native-born Russian teachers without knowledge of the course took the role of prisoners.) The soldiers gave the necessary commands: "hands up," etc., and asked important questions such as "What kind mine fields?" and "Where artillery?" And the soldiers understood the prisoners' answers.

Even soldiers whose lack of aptitude would make it impossible for them to learn Russian by conventional methods were able to complete the machine-taught course, it was reported.

The scientists who conducted the experiments are Dr. Eugene Rocklyn and Richard I. Moren of HUMRRO.

• Science News Letter, 78:179 September 17, 1960

Drug Against Fear

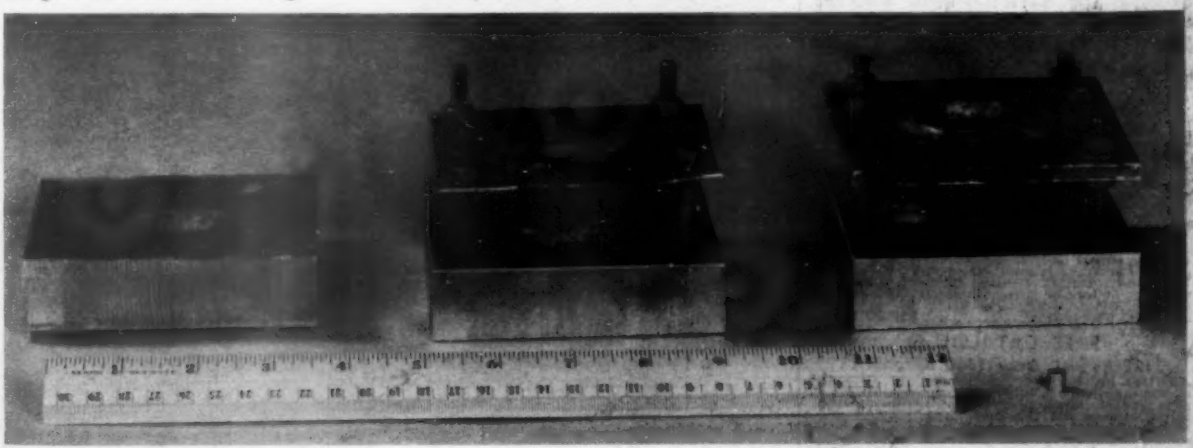
➤ A FAMILIAR DRUG may some day be used to protect men against the intense fear ordinarily experienced in combat.

Experiments with cats and rats giving rise to this hope were reported by Dr. Neal E. Miller of Yale University in his address as recipient of one of the 1959 American Psychological Association distinguished scientific contribution awards.

Previous studies have shown that the horrible fear in combat can cause not only combat neuroses, shell shock, but also psychoses and such psychosomatic symptoms as stomach acidity, ulcers, heart symptoms and increased susceptibility to infection.

In some of their experiments with rats, Dr. Miller and his associates first taught the animals to be scared of a flashing light at one end of an experiment box. This was done by giving them electric shock through a grid on the floor. The closer the rats approached the flashing light, the stronger was the shock.

With the aid of doses of sodium amytal, the rats would later go farther toward the light in the face of threat of possible shock



METEROID BUMPERS—Protective bumpers for outer walls of space craft can reduce the weight of the walls by more than 50 percent, tests showed at General Electric Company's Missile and Space Vehicle Department in Philadelphia. Aluminum pellets, half an inch in diameter, hit with a velocity of 15,000 feet per second, a block of unshielded aluminum (left), a one-inch aluminum block shielded by .063-inch of aluminum (middle) and a one-inch aluminum block shielded by .250-inch of aluminum (right).

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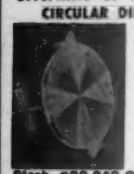

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than they would without the drug's aid.

Psychologists consider the possibility that sodium amytal can be used to help soldiers advance in battle in spite of great natural fear.

• Science News Letter, 78:179 September 17, 1960

Mental Hygiene Course

➤ IF A COLLEGE STUDENT registers for a course in mental hygiene in the hope that it will give him some inexpensive psychotherapy, he is doomed to disappointment.

Study of a mental hygiene class of 37 students showed that no significant improvement in adjustment was observed after the completion of the course, Dr. Conrad Chayette of De Paul University, Chicago, told the meeting of the American Psychological Association in Chicago.

The only significant change observed in the students was that they became somewhat more maladjusted in their home situations. It may be, Dr. Chyatte speculated, that the inept application of the superficial knowledge gained in the course acted to irritate relatives and others at home, making relationships more difficult.

• Science News Letter, 78:180 September 17, 1960

Reduces Stopping Time

➤ A WARNING SIGNAL before a traffic light turns from green to the warning yellow can help the driver reduce his decision and stopping time, the American Psychological Association was told in Chicago.

Drs. A. C. Busch and F. W. Trabold of Avco Corporation reported experiments with drivers of an automobile simulator that showed the advantages of the auxiliary cues displayed while the green light is on.

They also reported that a horizontal rectangular shape for traffic lights would be superior to the standard circles.

• Science News Letter, 78:180 September 17, 1960

Emotions Induced

➤ EMOTIONS induced in a person under hypnosis are real in the sense that they are accompanied by measurable physiological changes—the heart rate may speed up, for example. But the same emotions can be induced by suggestion in a waking person not under hypnosis and he will show the same physiological changes. The same changes take place in subjects who are not hypnotized, but told to pretend to be.

Experiments throwing this new light on hypnosis were reported to the American Psychological Association in Chicago by Drs. Esther Helfman, Ronald E. Shor and Martin T. Orne, all of the Massachusetts Mental Health Center in Boston.

The emotions induced in both hypnotized and waking subjects were fear, calmness, happiness and depression. Fear was found to be the most active emotion in terms of physiological changes; depression was found to be the least active.

The same differences in physiological changes accompanying the different emotions appeared in those who faked the hypnotic state as well as in those who were really hynotized.

• Science News Letter, 78:180 September 17, 1960

Can Choose Careers Early

➤ BOYS AND GIRLS can make a realistic choice of career as early as the fourth grade, Dr. Robert P. O'Hara of Boston College told the American Psychological Association meeting in Chicago.

Previously, it has been thought that fantasy-based choices—"I'm going to be a fireman because he drives a red truck"—are all that can be obtained from children through the sixth grade.

Dr. O'Hara's study of 1,200 boys and girls showed that in the fourth, fifth and sixth grades children can make a choice of a future career based on their own true aptitudes and interests.

• Science News Letter, 78:180 September 17, 1960

SCIENCE NEWS LETTER
VOL. 78 SEPTEMBER 17, 1960 NO. 12

Edited by WATSON DAVIS

The Weekly Summary of Current Science, published every Saturday by SCIENCE SERVICE, Inc., 1719 N St., N.W., Washington 6, D. C., NOrth 7-2255. Cable Address: SCIENSERVC.

Subscription rates: 1 yr., $5.50; 2 yrs., $10.00; 3 yrs., $14.50; ten or more copies in one package to one address, 7½ cents per copy per week; single copy, 15 cents, more than six months old, 25 cents. No charge for foreign postage.

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Printed in U.S.A. Second class postage paid at Washington, D. C. Established in mimeograph form March 13, 1922. Title registered as trademark, U. .S and Canadian Patent Offices. Indexed in Reader's Guide to Periodical Literature, Abridged Guide, and the Engineering Index. Member Audit Bureau of Circulation.

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CONSERVATION

Africa May Lose Wildlife

➤ THE GREAT WILD ANIMALS of Africa are vanishing. Civilization, fire and lack of water take their toll. A black market in ivory and rhino horn encourages poachers.

This dark picture of the Dark Continent was drawn at the Fifth World Forestry Congress meeting in Seattle, Wash., by Col. Merwyn Cowie, director of the Royal National Parks of Kenya.

"In Kenya, poaching is organized on a colossal scale, ivory and rhino horn being the main products. These are smuggled out through a highly organized ring of traders across the Indian Ocean to be sold for various purposes in the East and Far East." Col. Cowie reported that recently rangers found 1,283 elephants killed by poachers in an area only 20 miles square.

He said the poachers may use poisoned arrows, pits, snares and muzzle-loaded guns.

"Muzzle-loaders are primitive weapons, loaded by packing powder down the muzzle and then cramming the barrel with all kinds of missiles, including bent nails, stones or anything else that can be procured.

"The result of using such weapons is that a very large number of animals are wounded in addition to those which are mercifully killed quickly." Col. Cowie said that in Tanganyika alone there are 80,000 licensed muzzle-loaders in the hands of inexperienced hunters.

Arrows with poisons from trees are used in some parts of East Africa. After being hit, "an elephant sometimes dies within a few hours or lingers in pain for several days. When it eventually dies, the vultures form a spiral in the sky which indicates to the poachers precisely where to look for their prize. The tusks are then hacked out and cut up into sections and smuggled out through a highly organized smuggling ring."

Wire snares are often used to catch the wildebeest. Then, only its tail is taken to sell as a fly switch.

Col. Cowie said the African governments must strike hard at the poachers and what he called their crime against posterity.

But control of fire seems even more difficult. "I have never yet seen any part of Africa where it is entirely possible to prevent fire," he said.

And water supplies are frequently upset by man's activities. "Lake levels are falling, rivers are drying up and springs are disappearing."

Col. Cowie sees the extinction of many wild beasts unless they can be saved by sanctuaries. But, "the sanctuaries included in the system of national parks and reserves throughout Africa are hopelessly inadequate to preserve all the species which used to roam the face of this great continent," he said.

"Africa is a harsh master and its animals are subjected to all kinds of calamities, including epizootic diseases, floods, plagues and droughts.

"Should a species in one area be destroyed by one of these misfortunes, then there is no reservoir from which to draw replenishment."

• Science News Letter, 78:181 September 17, 1960

ROCKETS AND MISSILES

Big Space Effort Planned

See Front Cover

➤ THE UNITED STATES has big space plans for the next eight weeks. There will be attempts at a major step forward in the Mercury man-in-space program, the orbiting of a capsule about the moon, the orbiting of a defense satellite and the recovery of another instrumented capsule and a second capsule carrying a monkey—if all goes well.

MAN-IN-SPACE. A major test of the Mercury space capsule is about due. According to schedule, this first step would send the capsule into space and back—without orbiting. The launching vehicle would be a Redstone missile.

There will be no animal or man aboard this first time, but animals and man will follow later.

DISCOVERERS XV AND XVI. These are re-entry experiments. The Discoverer capsule, only a part of the whole Discoverer satellite, is much too small for a man. The Discoverer XV shot will be instrumented. Discoverer XVI is scheduled to contain a monkey.

MIDAS. This is the Defense Department's experimental satellite. It has infrared detectors to sight the heat from the blast-off of missiles. Probably one and possibly two Midas attempts will be made before November.

MOON ORBITS. There have been reports that National Space and Aeronautics Administration will launch a TV satellite and a space station for radiation, guidance, propulsion and communications studies, both to go into orbit around the moon. An official of NASA told SCIENCE SERVICE that the "leaks" in information so far were inaccurate in detail. But he confirmed plans for moon satellites "in 1960."

Less official sources still stick to their predictions. The shots, however, depend on the use of Atlas missiles, a military weapon over which defense requirements have priority.

COURIER. An "active" communications satellite with electronic devices to relay voice and teletype messages is also scheduled soon, probably in October. Courier is shown on the cover of this week's SCIENCE NEWS LETTER. Another "passive" communications experiment, like Echo, is probable.

TIROS. A second weather satellite that takes pictures of the earth's clouds is on its way, possibly within the next eight weeks.

• Science News Letter, 78:181 September 17, 1960

DROPPABLE POD—A two-part droppable pod provides extra speed and mileage to the Air Force B-58 bomber. The fuel-carrying lower part of the pod can be dropped when fuel is used. The upper part, containing a nuclear bomb, would be carried on to target in actual combat. The pod is in production at Convair Division of General Dynamics Corporation, Fort Worth, Tex.

BIOLOGY

Actinomycetes Classified

➤ SCIENTISTS now have a plan to use tiny bacterial viruses to identify and classify the slightly larger actinomycetes — the branching, thread-like microbes that produce most of the medically important antibiotics.

Biologists have long debated whether the actinomycetes are more closely related to the true bacteria or to the true molds. Dr. Selman A. Waksman of Rutgers University in New Brunswick, N. J., awarded the Nobel Prize for his work with streptomycin, believes the actinomycetes are bacteria.

A research team from the University of Minnesota in Minneapolis has found evidence in support of this theory.

Dr. S. Galen Bradley, D. L. Anderson and L. A. Jones reported to the American Institute of Biological Sciences meeting in Stillwater, Okla., that the actinomycetes, like bacteria, are dissolved by lysozyme (an enzyme in egg whites); that they are killed by antibacterial drugs, but not antifungal drugs, and are attacked by agents resembling viruses of true bacteria.

In addition, related actinomycetes are destroyed by the same virus, and this fact is the basis for a new classification-identification system.

This means that if a single type of virus is unleashed on three different types of actinomycetes and attacks only the first two, but not the third, the first two are related.

Thousands of actinomycetes have been isolated in the search for new antibiotics. The naming and grouping of actinomycetes are presently based on color and structure.

There is much confusion under this system, the Minnesota researchers noted. First, interpretation of color differs among biologists. Second, the nutritional state and age of the microbes affect color and structure.

The new grouping system, based on the susceptibility of actinomycetes to bacterial viruses, is expected to eliminate a large part of this confusion.

• Science News Letter, 78:182 September 17, 1960

Steaks of "Water Fleas"

➤ MAN IN SPACE may be eating "water flea" steaks as a part of his daily diet.

Dr. John R. Olive of Colorado State University in Fort Collins, attending the American Institute of Biological Sciences meeting in Stillwater, Okla., said the "water flea" Daphnia is not really a flea at all but a bedbug-sized soft-shelled crustacean that looks a bit like a tiny clam.

Grazed on algae pasture, it gains more weight percentagewise than cattle on regular grass pastures.

Preliminary experiments have shown that a water flea-algae mixture is palatable as soup, either cooked or uncooked. The mixture can also be dehydrated into a paste or into dried cakes.

It has a taste somewhat similar to shrimp, Dr. Olive said. With just a small amount of flavoring, the mixture can be made to taste like eggs or steak.

By adding only monosodium glutamate, a main ingredient in some commercial flavor accenters, the natural shrimp taste is emphasized.

Long-term tests to see whether human subjects can survive on this diet alone have not been performed to date.

Nor have the algae and water fleas been set up in a closed system which uses human waste products. But, Dr. Olive said, studies showed that the water fleas get along pretty well on solid wastes from mice, on brewers' yeast and on horse urine.

• Science News Letter, 78:182 September 17, 1960

Heart Rates Lowered

➤ TINY RADIO transmitters surgically implanted in animals or, in some cases, attached to the animal's body with a light harness have broadcast true resting heart rates as much as 25% lower than those recorded as standard.

The older resting rates were obtained by methods that restrained the animals and made them highly excitable, but the new method permitted the animals to be tested without restraining wires.

The work, reported to the American Institute of Biological Sciences meeting in Stillwater, Okla., was conducted by Dr. Warren O. Essler under the direction of Prof. G. Edgar Folk Jr. and Prof. Lawrence A. Ware at the State University of Iowa

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BIOLOGY

Americans Grow Taller Now Than 100 Years Ago

➤ YOUNG MEN and women in the United States today average about two inches taller than those 60 years ago, a study of the heights and weights of adults over the past 100 years shows.

Miss Milicent L. Hathaway and Miss Elsie D. Foard of the Department of Agriculture's Research Service report that the younger generation in college in recent years has averaged about on inch taller than their parents.

The sons weighed five to ten pounds more; the daughters, two to five pounds more. The USDA study also shows that men and women with some college training are taller and lighter than those with only elementary education.

• Science News Letter, 78:182 September 17, 1960

SOCIOLOGY

Mothers of Schizophrenics

➤ MANY SCHIZOPHRENIC patients have unwholesome relationships with their mothers, Dr. Victor D. Sanua of the School of Public Health, Harvard University, reported to the annual meeting of the American Sociological Association in New York.

Dr. Sanua presented a paper on the home environment of schizophrenic males from two religious groups, Protestant and Jewish, and of two social classes, lower and middle-upper.

He said some mothers were over-protective. Others were rejecting, domineering or aggressive. The fathers of these schizophrenics were reported as weak, submissive individuals.

In a study of 150 hospital case records of schizophrenic patients in mental hospitals in the Boston area, Dr. Sanua found that the mothers of Jewish patients of low-socioeconomic status appeared to be more disturbed than the fathers.

In the Protestant families of low-socioeconomic status, the father showed more psychological disturbance than the mother.

• Science News Letter, 78:182 September 17, 1960

Crimes and Criminals

➤ ONE criminal will commit crimes against persons only; another will commit crimes against property only. Seldom does a person commit both types of crimes, arrest records indicate.

Drs. David J. Pittman, Richard A. Peterson and Patricia L. O'Neal of Washington University at St. Louis, Mo., reported these results to the annual meeting of the American Sociological Association in New York on the basis of arrest records of 88 criminals.

They also studied intensively 19 males and found that the "person offenders" had suffered more from early broken homes, severe rejection and cultural deprivation than did the property offenders.

• Science News Letter, 78:182 September 17, 1960

"Beatness" Is Apathy

➤ THE "BEATNESS" of today's beatniks is merely apathy grown self-conscious, Dr. Elwin H. Powell of the University of Buffalo told the American Sociological Association annual meeting in New York.

The rebellion of the "beat generation" represents a shift from radicalism to bohemianism, from active protest against an institutional order to a preoccupation with personal relations, Dr. Powell said.

Where a radical would try to change society, the beatnik revolts by trying to establish an individual identity. This identity he achieves through a refusal to act.

The "beat" cult enables the individual to stand apart without standing for any ideology. All the eccentric expressions of the cult, such as rites, rituals, dress and a special slang, contribute to this feeling of apartness. The use of drugs and religious mysticism may also enhance this feeling.

• Science News Letter, 78:182 September 17, 1960

MEDICINE

Ultrasonics Heals Wounds

➤ ULTRASONICS—sounds that connot be heard by the human ear—can heal wounds, clear up infected sinuses, relieve arthritic pain and treat acute asthma. They have even been used with success in an Army hospital to relieve pain arising from amputations, scars and neuromas.

These medically beneficial sounds are produced by the same type of mechanical vibrations that produce such familiar sounds as the boom of a cannon, the ringing of a telephone or the sound of the human voice. The difference is that the familiar sounds we hear seldom vibrate at frequencies higher than 20,000 cycles per second whereas ultrasonic vibration may be 100,000 or several million cycles per second.

Nearly all medical ultrasonic equipment has been designed for clinical use at one million cycles (one megacycle). Sonic energy at one megacycle has some of the characteristics of light—it may be reflected or refracted. It can penetrate even more than light as it can travel through solids and liquids.

However, an important feature of medical ultrasonic energy is that it will not pass through air. Therefore, to be used with the most benefit in healing, it must be applied by means of a transducer directly to the surface of the skin of the area to be treated.

Areas too sensitive to permit direct application of the transducer are submerged in water. Then the treatment can be given without any pressure or contact that might cause pain to the patient, because of the ability of the energy to pass through water.

At the Second International Conference of Ultrasonics in Medicine held in Washington, D. C., 500 members and guests heard Dr. David Rubin, associate clinical professor of physical medicine and rehabilitation of the University of Southern California School of Medicine, describe the successful use of ultrasonic therapy on amputees whose stump pain before treatment made the use of artificial limbs an agony. After a few treatments with the inaudible sound, the pain was sufficiently relieved to allow full use of the artificial aids. He also reported success in joint involvement in rheumatoid arthritis.

Dr. Carlos Bustamente Ruiz of Lima, Peru, also endorsed the effectiveness of ultrasonics in reducing pain. "We don't know exactly the mechanism by which pain is reduced or disappears," he said. "We believe its action is indirect."

While the exact mechanism of this tool is not understood, much progress has been made in establishing "when, how often and with what intensities and frequencies ultrasonic radiation should be used for various conditions," Dr. John H. Aldes of Los Angeles, executive secretary to the Conference and a pioneer in medical ultrasonics, told SCIENCE SERVICE.

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PUBLIC HEALTH

Radiation Damage to Minds

➤ MENTAL RETARDATION and loss of memory may result from long-term exposure to radioactive fallout or other sources of low-dose levels of radiation, Soviet scientists say.

Soviet radiobiologists and psychologists claim that their experiments with dogs show that after such exposure, the animals do not learn as readily and may forget recent experiences.

The Soviet study was reported at the first International Symposium of the Response of the Nervous System to Ionizing Radiation, held at Northwestern University's Medical School in Chicago.

Both Soviet and American scientists agree that the nervous system is affected by radiation. They differ, however, on the extent of low-level radiation effects on this area.

United States scientists, as well as most Western world researchers, believe that the nerve tissue (compared to bone marrow and connective tissue) is more resistant to radiation and is not structurally altered at low-dose levels.

The Russians do not claim to have evidence of structural changes at low-level exposures. They do claim that radiation alters metabolic processes in nerve cells. They believe their low-level experiments with the dogs is evidence of altered metabolic processes.

About 300 of the world's leading scientists concerned with the effects of radiation on the nervous system participated in the Symposium. They included representatives from the U. S., USSR, Mexico, South America, Western Europe and Japan. The Symposium was sponsored by a $25,000 research grant from the U. S. Public Health Service and the U. S. Atomic Energy Commission.

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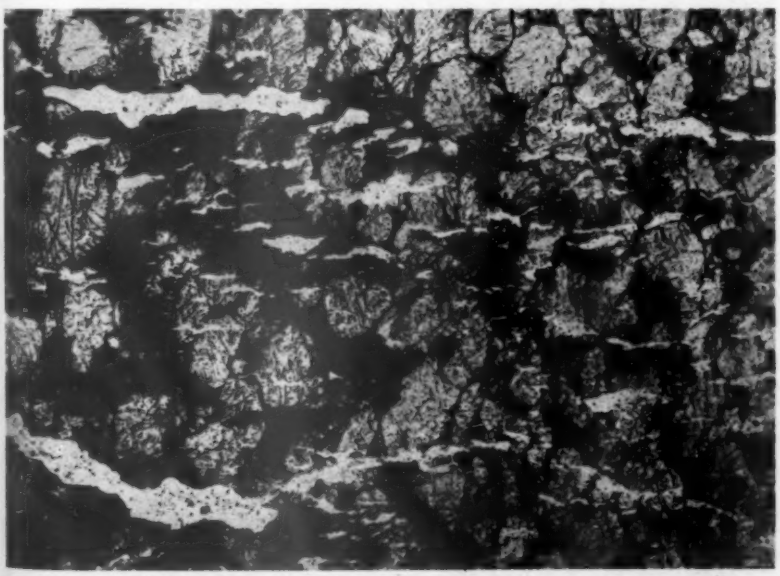

COESITE MAGNIFIED—A photomicrograph shows sheared Coconino sandstone, containing coesite, magnified about 30 times. The sandstone appears grey whereas the coesite is contained in the dark matrix. The first two discoveries of coesite, a rare form of silica, were made by U. S. Geological Survey scientists recently.

GEOLOGY

Coesite Discovered In Bavarian Crater

➤ COESITE, the dense and highly stable form of silica not known to occur naturally on earth before it was recently collected and identified by U. S. Geological Survey scientists at Meteor Crater, Ariz., has now been recognized in rock specimens collected near the rim of Germany's famous Rieskessel in Bavaria, by Dr. Eugene M. Shoemaker, Survey geologist. Dr. Shoemaker regarded the original find in Arizona as conclusive evidence that the crater resulted from a collision between the earth and a sizeable meteorite.

The new find means that there are now two places known on earth where coesite occurs in nature. It strengthens the contention of certain German geologists that the Rieskessel was a meteor impact crater. (See story SNL 78:25, July 9, 1960.)

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MEDICINE

Repair Human Bladder With Transplants

➤ DAMAGED PORTIONS of the urinary tract can be repaired by using segments of the small intestine.

A team of urological surgeons at the University of California Medical School, Los Angeles, headed by Dr. Willard E. Goodwin and including Drs. Roderick Turner and Chester Winter, have employed several surgical techniques using loops of small intestine (ileum) to repair ravages of disease or injury in the urinary tract.

In one such procedure the piece of intestine is used to repair or enlarge a damaged bladder. A "cup" is formed from the loop of small intestine taken from the patient. The bladder is then opened and the cup is sewn to the bladder, becoming the dome or top portion of the bladder.

Thus the capacity of the bladder, which had become limited through disease or injury, is restored to near normal, and the patient is greatly relieved.

Another procedure utilizes the intestinal segment to replace a damaged ureter (the tube which drains the urine from the kidneys into the bladder).

Use of intestinal segments in urological repair is not a brand new concept, Dr. Goodwin pointed out. This type of surgery was tried and abandoned more than 50 years ago. Only in recent years has it received renewed attention.

These procedures have been used successfullv on approximately 50 patients at UCLA.

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MEDICINE

Physician's Burned Hand Leads to New Treatment

➤ THE PAIN of burns can be lessened and healing speeded by immediate treatment with ice water, a physician has accidentally discovered.

Dr. Alex G. Shulman of Los Angeles began this treatment eight years ago after he burned his own hand with boiling grease.

"In the ensuing agonizing few minutes," he said, "it seemed logical to plunge the hand into a tub of cold water."

Dr. Shulman found that after about an hour's immersion his hand could be removed without further pain of any consequence and that the burn seemed to heal more rapidly than he expected.

He reports in the Journal of the American Medical Association, 173:1916, 1960, that since his accident he has successfully used ice water as an initial treatment of 150 patients for burns of all degrees but covering less than 20% of the body.

The treatment should be begun at once, but if patients come in already bandaged, Dr. Shulman soaks off the dressings under ice water and continues the immersion from 30 minutes to five hours. Pain may return as the water becomes warm but the addition of ice cubes gives continued relief.

No infections occurred in patients treated within one hour after the burn.

The physician adds hexachlorophene to the ice water in a basin, or if burns of the head, neck, shoulders, chest or other parts of the anatomy make immersion impractical, he applies towels chilled in the disinfected solution.

Dr. Shulman has observed that the usual inflammation following the burn can be reduced and at times stopped by ice water therapy. He says:

"While the value of this mode of therapy for patients with extensive burns in shock remains to be tested on a large scale, its merits for those with burns of lesser degree should not be doubted."

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METEOROLOGY

Storm Waves Forecast By Electronic "Brain"

➤ A FAST, ACCURATE method of forecasting hurricane-caused storm waves, the biggest killer when tropical storms hit the mainland, has been developed at Texas A. and M., College Station, Texas.

The method gives more reliable estimates of the period, height, and place and time of contact of storm surges caused by hurricanes and other meteorological conditions.

Dr. Basil W. Wilson, professor of engineering oceanography at Texas A. and M., said an IBM 704 computer has been used to spell out the direction of attack, the height of the wave at any given point along the fetch line, the velocity of the wave crest, the rate of change of the wave action as the hurricane progresses, and the rate of movement.

Since the information required to calculate these factors is not available while a hurricane is in progress, Dr. Wilson proposes to plot a number of previous hurricanes, then store these models in the computer. As a new hurricane developed, data on it would be fed to the computer, which would automatically match up the new hurricane with the one in its memory having the most similar characteristics.

• Science News Letter, 78:184 September 17, 1960

ENGINEERING

Engineers Promote Astronaut-Technician

➤ A TECHNICIAN trained to make spaceship or satellite repairs would make a top-notch astronaut, three engineers told the Pacific General Meeting of the American Institute of Electrical Engineers in San Diego, Calif.

The United States currently is training seven Mercury astronauts, all test pilots with engineering backgrounds. But M. A. Grodsky, Girard W. Levy and Robert D. Sorkin, all of the Martin Company in Baltimore, Md., said a technician in a satellite could detect and repair system malfunctions.

They said such a technician would require extensive training, probably with an earth-bound model of the unit he will later work with in space. But they believe adding a technician could provide a payload saving because of the versatility of such a worker.

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IN SCIEN

ASTRONOMY

Largest Known Shower Of Cosmic Rays Seen

➤ THE LARGEST and most "powerful" cosmic ray shower ever observed has been recorded by scientists at the Massachusetts Institute of Technology, Cambridge, Mass.

It confirmed evidence that some cosmic rays come from outside the Milky Way galaxy in which the sun and its planets, including earth, are located. The very high energy shower was analyzed by Drs. John Linsley and Livio Scarsi, who are stationed at M.I.T.'s research station in New Mexico.

The cosmic ray shower occurred about midnight on Dec. 3, 1959. Scientists have been analyzing results since then. In a period of only ten-millionths of a second, about ten billion atomic particles rained down on the New Mexico station's detectors.

The scientists estimate that the primary cosmic ray causing the shower had an energy between 20 and 40 billion billion electron volts. Cosmic rays are particles from space constantly bombarding the earth's atmosphere.

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ASTRONAUTICS

"Paraglider" Passes Re-entry Test

➤ ASTRONAUTS could glide back to earth on a flexible "paraglider," a cross between a parachute and a glider, studies reported to the National Aeronautics and Space Administration show.

The glider is so simple it looks like something a boy might devise to glide off a garage roof: a flexible wing with rigid leading edges. A space capsule with an astronaut inside could be suspended below the glider.

NASA has been looking for a low-weight device to slow the speed of re-entry so that a space capsule does not burn up from air friction. The paraglider is light and could remain compactly folded until needed.

Research has shown that maximum re-entry temperatures could be held as low as 1,500 degrees Fahrenheit by the paraglider.

A paraglider of a nonporous material such as aluminum alloy would slow re-entry much better than a conventional parachute at supersonic speeds, wind tunnel tests demonstrated. At these speeds, parachutes exhibit a pumping action that makes them bounce their cargo dangerously.

The research was conducted at the Langley Research Center at Langley Field, Va., by Francis M. Rogallo, John G. Lowry, Delwin R. Croom and Robert T. Taylor. They report that several methods of packing and deploying the paraglider have been successfully demonstrated.

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E FIELDS

GENERAL SCIENCE

"Science City" Proposed; Would Include Academy

➤ LEGISLATION to build "Science City, U.S.A." will be introduced in Congress next January by Rep. Victor L. Anfuso (D.-NY), a member of the House Committee on Science and Astronautics The proposed legislation has the support of Sen. Lyndon B. Johnson, Democratic candidate for vice president.

Rep, Anfuso told SCIENCE SERVICE that much planning and research had gone into the preliminary drafting of the bill to create the Government-sponsored scientific research and education center "to be dedicated to peace and human welfare." He is still working and incorporating proposals that will make "Science City" the greatest scientific research center in the world.

A bill to establish a National Science Academy for science studies, on the order of West Point and Annapolis, was introduced this session by Rep. Anfuso. He emphasized that the proposed Science Academy would be non-military in nature but like the military academies would be wholly supported by Federal funds.

Science City would include in its area the National Science Academy. The Academy, as outlined in the bill, would have a graduate as well as an undergraduate program of study. It would have access to all the research going on within Science City: astronauts, bio-sciences, physics, electronics, mathematics, geophysics, oceanography, meteorology and many others. The Academy also would provide fellowships to foreign students, to be admitted on an exchange basis.

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NUTRITION

Nursing Mother Will Use Own Calcium for Baby

➤ THE OLD BELIEF that a pregnant or nursing mother will steal from her own body to supply her baby with needed calcium has turned out to be scientifically correct, at least for rats.

This fact, differing sharply from recent findings on other essential nutrients, was confirmed in a research report presented at the Fifth International Congress on Nutrition in Washington, D. C.

The report tells of experiments conducted on pregnant and lactating mother rats and their young by two University of California scientists, Dr. C. Willet Asling, professor of anatomy at Berkeley, and Dr. Marjorie M. Nelson, lecturer in anatomy at Berkeley and the San Francisco Medical Center.

While results of the calcium study agree with widespread popular opinion, other findings in this area of science have shown that the old rule of thumb about mothers supplying all the nutrients needed by their young cannot always be trusted.

One recent study by Drs. Asling and Nelson showed that severe prenatal deficiencies of folic acid, a B vitamin, can cause serious deformities in the newborn.

Two groups of rats were used in the calcium experiment, all given identical food, except that the diet of one group was deficient in calcium. As offspring were born and weaned, mother and baby rats were studied by means of X-ray techniques and their bones were measured and examined microscopically.

The researchers found that neither the mother rats nor the young showed any differences in skeletal growth or maturation that could be attributed to calcium-deficient diets. Nor did the young in deficient group show any shortage of calcium or less of density in their bones.

The calcium-deficient mothers, however, showed marked effects of skeletal demineralization, indicating that calcium had been taken from their bones to provide adequate supplies for their unborn or nursling young.

The California scientists reported that "it was possible to demonstrate a reduction in maternal bone density to 83% of the normal value when the calcium deficiency occurred only during lactation, and a further reduction to 73% when the deficiency started at the beginning of pregnancy."

While the popular notion about mothers compensating for a lack of calcium has been verified, another widespread idea about mothers losing "one tooth per baby" appears to lack confirmation in modern research, Dr. Asling has said.

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AGRICULTURE

Plastic-Coated Fertilizer For Controlled Growth

➤ PLASTIC-COATED fertilizer capsules may be used on some crops in the future to provide controlled release of plant nutrients.

Soil specialists O. J. Attoe, L. E. Engelbert and W. C. Dahnke of the University of Wisconsin, Madison, Wis., said that such controlled release of nutrients could be highly valuable in fertilizing grass for pastures, lawns and golf courses. The fertilizer effects would be spread over a longer time, supplying nutrients as they are needed throughout the growing season, rather than providing a surplus right after fertilizing and a shortage later in the season.

In experiments, the three researchers found that plastic-coated fertilizer capsules gave a much more uniform growth of grass throughout the growing season. In regular fertilizing, the part of the fertilizer which is not used in the first crop is only partly available to succeeding crops, because water, soil bacteria and minerals in the soil remove some of the nutrients or make them unavailable to plants. A slow release of the nutrients would help overcome this.

Mechanical details will have to be worked out and tested before the process of plastic coating can be practical for fertilizer manufacturers, the researchers said.

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GEOPHYSICS

Nuclear Detonations Detected the World Over

➤ NUCLEAR DEVICES exploded high in the atmosphere above the southern Atlantic Ocean in the Argus project produced geomagnetic disturbances that spread to almost all parts of the world.

Drs. W. K. Berthold, A. K. Harris and H. J. Hope of the U. S. Army Signal Research and Development Laboratory, Fort Monmouth, N. J., report in the Journal of Geophysical Research, 65:2233, 1960, that the geomagnetic variations were recorded principally by induction-type magnetometers and earth-current stations. The variations had a period of one to three seconds.

Signals from the Aug. 27 to Sept. 6, 1958, detonations were detected in such scattered areas as Arizona, Maine, Iceland, Sweden, the Azores, France, equatorial Africa, the southern Indian Ocean and Antarctica.

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NUTRITION

Men Need More Food In High Temperatures

➤ MEN NEED MORE food when they live in extreme heat than when they live in moderate temperatures, an Army study at Yuma, Ariz., has shown. The study upsets older theories that men's caloric requirements are higher in cool weather.

Personnel of the U. S. Army Medical Research and Nutrition Laboratory at Fitzsimons General Hospital in Denver made the studies with eight conscientious objectors who volunteered as test subjects.

In one ten-day experimental period, the men worked and ate in the hot sun, at 105 degrees Fahrenheit. In a second period they worked and ate in hot shade, 104 degrees. In a third, they were in an air-conditioned room, 78 degrees.

The men could eat all they wanted at all times. Food intake per man per day was 400 calories higher in the hot sun and hot shade than in the cool room. The men gained weight slightly in the heat because of a gain in the fluid held in their bodies. But this fluid gain exceeded the total weight gain so that the men actually lost body tissue during the hot periods, presumably to satisfy the energy requirements of their bodies.

The researchers say that in all likelihood the increased requirements resulted from a combination of such factors as increased action of the blood in heat transport, increased action of the sweat glands, increased caloric loss because of sweat vaporization and increased metabolism because of the elevation in body temperature.

The study was reported at the Fifth International Congress on Nutrition in Washington, D. C., by C. Frank Consolazio, chief of the bioenergetics division of the Laboratory. Working in association with Mr. Consolazio were Ralph Shapiro, John E. Masterson and Philip S. L. McKinzie.

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ASTRONAUTICS

Astronauts Need Patience

Project Mercury has slipped behind. The launching of the first U. S. spaceman is now scheduled for late in 1961, W. T. M. Grigg reports.

➤ BEFORE THE SEVEN Mercury Astronauts were picked, each went through elaborate psychological tests, presumably to make sure they would not crack up under the stresses of space flight. Today it appears they will need all the stability and patience they can muster just to sit it out on the ground until the project's now-distant launch date.

For whereas National Aeronautics and Space Administration officials once planned to orbit a man in space by early 1961 or, some hoped, late 1960, now they schedule only a preliminary non-orbital shot of a manned Mercury capsule within that time. NASA now has no plans to orbit a man before the last part of 1961.

Some observers are already beginning to wonder aloud whether even late 1961 is not an overly optimistic date for the grand finale. Many are convinced that even if the present schedule is met, the United States astronaut will only be duplicating what a Russian astronaut will already have done.

Just what has happened to Project Mercury?

It is the child of a young parent. NASA itself was created in the fall of 1958. Although it absorbed the experienced personnel of the National Advisory Committee for Aeronautics, the expanded NASA has had some growing pains. And although NASA inherited NACA's research centers, the new agency did not have all the facilities it needed.

NASA has taken over the Navy team for Project Vanguard. Where Army research was formerly done, under contract, at the Jet Propulsion Laboratory near Pasadena, Calif., NASA work is now done.

Army Facilities Go to NASA

Dr. Wernher von Braun, his team and the Army rocket facilities at which they worked have now been transferred from the Army to NASA. The official change was made a few weeks ago and the laboratories at Huntsville, Ala., were named the George C. Marshall Space Flight Center.

NASA will soon add another big facility, the Goddard Space Flight Center, now being built at Greenbelt, Md. Broad research will be conducted there. NASA headquarters personnel also need a new home. They now have their offices in the old Dolly Madison house, built for President Madison's wife near the White House.

With all the past and planned expansion, there inevitably have been some changes and red tape to hamper the Mercury Project. But Mercury has also found advantages in a new organization.

There were no entrenched lines of command and "ways of doing things" to be combated. In fact, since NASA looks on Mercury as its first priority job, the Project has been uniquely sheltered from upsets.

Much of the Mercury Project was kept in the hands of trusted personnel absorbed from NACA, and NASA's Space Task Group for Mercury was placed at NACA's former center, the Langley Research Center at Hampton, Va. Much of the personnel had worked there under NACA.

Four days after NASA become operative, its personnel produced Mercury plans. Simplicity was an objective. The plans specified that no major scientific breakthroughs would be required. Mercury was to be a magnificent job of engineering, using known techniques.

The publicity surrounding the Mercury plans and the later announcement of seven Astronauts to be trained for the flight immediately produced the atmosphere of a race with Russia—a race that NASA officials even then were far from sure of winning.

Almost as if they were already accomplished, the plans were unveiled: an Atlas rocket would carry the manned Mercury capsule into orbit and after three trips around the earth, the capsule would be pushed out of orbit by retro-rockets and fall into the Atlantic Ocean.

But later, Congress balked at NASA's big budget. It was reduced and some of the funds that were cut had to come from the Mercury Project. Later, funds were restored, but this money, coming late, did not permit the program to move as fast as the same amount would have if provided earlier.

And then, "sometimes you have a bad day," as one of the Astronauts is fond of saying. Bad days have been frequent for Mercury. In early stages of the program, it appeared the "bugs" would never be eliminated from the Atlas rocket. Then they finally seemed to be.

But, in the first of the major shots planned to lead up to the orbiting of a manned capsule, the Atlas failed again.

Built High Hopes

With chances for being first with a man in space so slim, NASA may have been mistaken in permitting the Mercury Project to take on the aura of an out-and-out race with Russia. The publicity built hopes for

ASTRONAUT IN PRESSURE SUIT—Astronaut Walter Schirra tests a full pressure suit for water tightness in a swimming pool. He is assisted by fellow Astronaut Alan Shepard. The suit, manufactured by B. F. Goodrich Company, was developed for the seven Astronauts for NASA's Project Mercury manned orbital flight program.

the project so high that if Russia succeeds first, the U. S. may face another Sputnik embarrassment.

At the time of the first Sputnik the U. S. also talked of an earth satellite but the USSR produced one before the U. S.

And being second in a two-nation race is just about as expensive to the taxpayer as being first. About the same number of rockets must be built; the same number of engineers and scientists must be hired.

The result of the work will be an exciting ride and some new data about man's abilities in space. This is how Dr. T. Keith Glennan, administrator of NASA, has described the finale:

"A young man in a pressure suit will step from a gantry tower into a checkered capsule atop a giant Atlas missile. About one hour later, with the pilot secure in a form-fitting couch facing upward, the hatch will be bolted. With a roar, the missile will streak into space.

"The Mercury vehicle will be launched from the Atlantic Missile Range, Cape Canaveral, Florida, in a direction just slightly north of east so that it will pass over Bermuda during the orbital injection process. Actually the vehicle will fly in a closed circular path around the earth, but when such a path is projected on a flat map representation of the earth's surface, the result is an apparent undulating or sinusoidal path.

"According to present plans, the vehicle will circle the earth three times, taking about one and a half hours an orbit for a total flight time of about four and a half hours. On the third pass, as the vehicle approaches the western coast of North America, the retro-rockets will be fired, reducing the flight velocity about 500 feet a second. This decrease in velocity will cause the vehicle to enter the atmosphere on a ballistic flight path, and it will eventually land in a recovery region in the western Atlantic Ocean. A recovery team of U. S. Navy and Air Force units will locate and retrieve the vehicle and the Astronaut."

If a Mercury Astronaut should not be the first man in space, U. S. scientists will still have gained important data on how a man will function in the weightlessness of space —on whether or not the lack of gravity seriously disturbs a man physically or mentally.

The U. S. also will have another proved method of returning objects from orbit. (The Air Force Discoverer experiments already have demonstrated one successful method.)

But what will be the cost to the U. S. prestige if a Russian is lauded by a future generation as Lindbergh has been by the generation past?

• Science News Letter, 78:186 September 17, 1960

Do You Know

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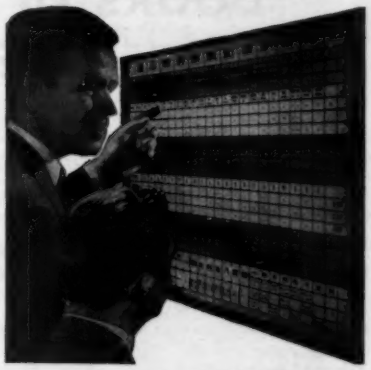
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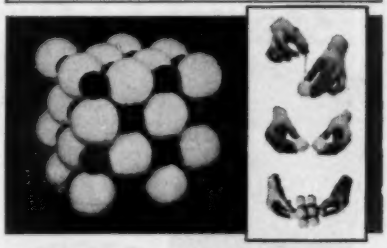
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ADVANCES IN BIOLOGICAL AND MEDICAL PHYSICS, Vol. VII—Cornelius A. Tobias and John H. Lawrence, Eds.—*Academic*, 362 p., illus., $10. Discusses among other research P^{32} decay in bacterial viruses and the physiological effects of nuclear radiations on the central nervous system.

ALTERNATING-CURRENT CIRCUITS—Russell M. Kerchner and George F. Corcoran—*Wiley*, 4th ed., 602 p., illus., $8.75. Text for introductory course, includes material on topology, duality, and the pole-zero method of circuit analysis.

ARCHAEOLOGISTS AND WHAT THEY DO—Robert J. Braidwood—*Watts, F.*, 180 p., $3.95. Archaeologist informally discusses his profession, giving an account of actual expedition to Iran.

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BASIC SCUBA: Self-Contained Underwater Breathing Apparatus—Fred M. Roberts, foreword by Edgar End—*Van Nostrand*, 386 p., illus., $8.50. Text on the operation, maintenance and safe use of all types of diving equipment.

CALCULUS AND ANALYTIC GEOMETRY. Part 1: Functions of One Variable and Analytic Geometry. Part 2: Vectors and Functions of Several Variables—George B. Thomas, Jr.—*Addison-Wesley*, 3rd ed., 674 p., 290 p., $6, $4.75. For students of science and engineering.

CHRISTIANITY AND THE SCIENTIST—Ian G. Barbour—*Assn. Press*, 123 p., $2.50. The author, a physicist, considers the position of the scientist between two areas of loyalty: dedication to science and commitment to God.

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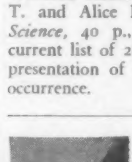

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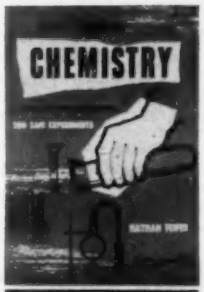

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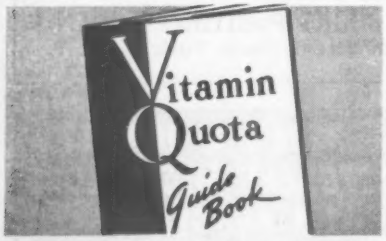

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MEDICINE

Super-Penicillin Arrests Resistant Staphylococci

➤ A NEW PENICILLIN developed at the Beecham Laboratories arrests staphylococci that are resistant to ordinary penicillin.

"Staph" has caused serious epidemics in even spic-and-span hospitals.

The new drug, covered by patents, is partly synthetic and partly extracted from a mold. The super-penicillin was made possible by the isolation of the central core of the penicillin molecule last year.

Full details on the new antibiotic were published in the British Medical Journal, Sept. 3, 1960.

The research team that developed the drug was led by Dr. George Rolinson. The scientists had guidance from Dr. Ernest Boris Chain, a scientist who shared the 1945 Nobel Prize for helping discover penicillin.

The new penicillin is absorbed into the blood stream and kills staphylococci, including those resistant to the older penicillins.

• Science News Letter, 78:190 September 17, 1960

MEDICINE

Staph Vaccine Helps Where Antibiotics Fail

➤ A STAPHYLOCOCCI vaccine has been developed by two researchers.

Drs. Kenneth L. McCoy and Eugene R. Kennedy of Providence Hospital report in the Journal of the American Medical Association, 174:117, 1960, that the vaccine brought an excellent response in 44 of 60 patients. The 44 had a rapid clearing of infection and freedom from reinfection for six months or longer.

The vaccine was used when antibiotics and other routine treatments failed. Staphylococci are bacteria that often cause such skin infections as boils.

• Science News Letter, 78:190 September 17, 1960

Questions

ASTRONAUTICS—How many times is the manned Mercury vehicle scheduled to circle the earth? p. 187.

GEOLOGY—Where has a second deposit of coesite just been discovered? p. 183.

MEDICINE—Why is ultrasonic energy most beneficial when directly applied to the skin of the area to be treated? p. 183.

PSYCHOLOGY—Which drug may be used to protect men against fear in combat? p. 179.

Photographs: Cover, Lt. Cecil W. Stoughton, Dept. of Defense; p. 179, General Electric Co.; p. 181, Convair Division of General Dynamics Corp.; p. 183, U. S. Geological Survey; p. 186, National Aeronautics and Space Administration; p. 192, Damar Products, Inc.

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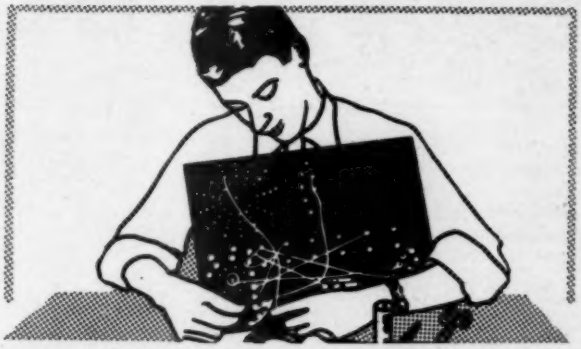

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• Science News Letter, 78:192 September 17, 1960

KITCHEN GREASE MONKEY is an attractive cup used to collect bacon drippings, excess cooking oils. The grease monkey has disposable cup inserts that may be thrown away when filled with grease.

• Science News Letter, 78:192 September 17, 1960

RADIOACTIVE MATERIALS CONTAINER is a device for the transport and storage of radioactive isotopes. The steel container will withstand rugged use without denting; thus the top will always fit securely. A stainless steel handle locks the top in place.

• Science News Letter, 78:192 September 17, 1960

TOY TAPE RECORDER, shown in the photograph, is a transistor-powered tape recorder which performs like a highly sensitive, expensive recorder. Contained in a two-tone, high-impact, unbreakable carrying case, the unit includes the ultra-sensitive microphone, earphone, direction booklet and two spools containing 100 feet of standard magnetic tape.

• Science News Letter, 78:192 September 17, 1960

OVERHEAD LAB PROJECTOR enables a teacher to project small specimens, chemicals, or an actual, on-the-spot experiment for students to see as it progresses. The 35mm projector is useful for group viewing in classroom or industrial laboratory. It will also serve as a slide, film strip or micro-projector.

• Science News Letter, 78:192 September 17, 1960

AIR-COOLED PIPE features six nylon cooling fins around the bowl. This finned, exterior bowl opens to expose the interior bowl of fire-resistant, shock-proof clear glass that can be removed for cleaning. The entire pipe is washable and very light.

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CHIC HANDBAG FLASHLIGHT looks more like a lipstick case than a utilitarian accessory. Fashioned like a piece of costume jewelry, the light is 3½ inches long. It fits easily into a handbag or evening purse where it is handy to light up a walkway, a keyhole or the fine print of a theater program.

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LIGHTWEIGHT AIR SAMPLER weighs nine pounds and samples air at the rate of two cubic feet a minute. The industrial hygienist, safety inspector, process engineer, air pollution scientist or anyone interested in air quality will find the dust instrument a useful tool for survey work.

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Nature Ramblings

➤ "LOOK OUT, JOHN Here comes mama!"

John Gillespie ducked his head just in time to avoid the talons of a female osprey that swooped down with all the fury of a mother whose young are in danger. Only the rope tied round his waist kept him from falling headlong from the tall nest tree. But with a bit of maneuvering and more luck, Gillespie was soon out of the osprey's reach and safe on the ground.

This was all in a day's "play" for John Gillespie, who for 16 years, from 1926 to 1941, spent his free moments banding baby ospreys (or fish hawks, as they are also called) on the New Jersey coast.

In this time, the "osprey man" banded 457 of these great birds of prey, of which 76 have been recovered—a large percentage of band returns. Recoveries of bands for all species of birds is only about one percent, so Gillespie's record is somewhat phenomenal.

The "osprey man" banded most of his birds in the Cape May region of New Jersey. From his band returns, he learned that these Jersey-born birds ranged as far away from home as the valley of the Amazon River. Other returns came from Cuba, the Dominican Republic, Puerto Rico, Colombia and Venezuela, as well as a number of records from all along the east coast from Pennsylvania to Florida.

Osprey Man

One of the most intriguing returns of an osprey band involved a nestling bird banded near Cape May on July 16, 1939. Five months later this bird was killed in Rio de Janeiro, Brazil, a straight-line distance of over 7,000 miles from its birthplace. Another Brazilian return came from the Amazon valley, four years after the bird was banded. Had this bird returned to his New Jersey home each breeding season of his life? What other distant parts of the world had been visited by this wanderer?

Another osprey mystery was turned up by John Gillespie. In the summer of 1939, within a two-week period, Gillespie banded three young ospreys. All three were later taken separately at different localities in the eastern province of Cuba, Oriente. More than that, the three birds were taken within a month's time of each other, three years after they had been banded!

John Gillespie did not pick an easy hobby, but he picked a fascinating one. Like the famous Charles Broley, the "eagle man" who began banding bald eagles in his retirement years, Gillespie defied danger and inconvenience to search out the secrets of a mighty bird of prey.

The "osprey man" had to halt his banding operations in 1941. He died in 1956; but two months after he had passed away, a return came in from one of his birds. This bird, killed on high tension wires at Cape May, had been banded by the "osprey man" 18 years previously as a nestling at that same Cape May. —HORACE LOFTIN

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